

Setting the Standard

Raising Academic Achievement

Mathematics

5-8 Standards Guide

for Parents and
Community Members



Student's Name



Setting the Standard, Expecting the Best

Dear Parents and Guardians,

Your child deserves the best — in education and in life. At Cincinnati Public Schools, we want to provide our students with the best opportunities to learn. That includes giving you the tools you need to nurture your child's growth at home.

As adults, we know that we can work harder, and smarter, when we know what's expected of us. This booklet outlines our expectations for what students need to know about math from 5th through 8th grade. These are not only district but state-wide standards, developed by a dedicated group of teachers, parents and school administrators from across Ohio. Together, they provide a guide for the knowledge of mathematics that all successful students need to master.

You won't find a crash course in algebra or trigonometry here, though we have included a glossary to help explain some math terms. Instead, you'll read about the many ways your child will learn to solve problems and analyze information. In addition, we've included tips on how you can support your child's learning.

We hope you'll keep this booklet handy to chart your child's progress through 8th grade and that you will use it as you talk with teachers about your child's skills and knowledge.

As we work together to support your child's learning, we encourage you to find out more about our district's academic standards, either online or at your child's school. You also can visit the CPS Web site at www.cps-k12.org to see a comprehensive explanation of all the standards (click the Standards button on the home page). The back of this booklet contains additional Internet and other math resources for families.

In the end, these learning goals do more than provide expectations on important skills and strategies. They also help us communicate how much confidence we have in your child's ability to learn and grow. Through our standards, we want to make it clear that we expect great things from every CPS student in every one of our schools. And we look forward to working as a partner with you to achieve academic excellence — and a bright future — for your child.

Sincerely,

Alton Frailey
Superintendent
Cincinnati Public Schools

About Mathematics Standards

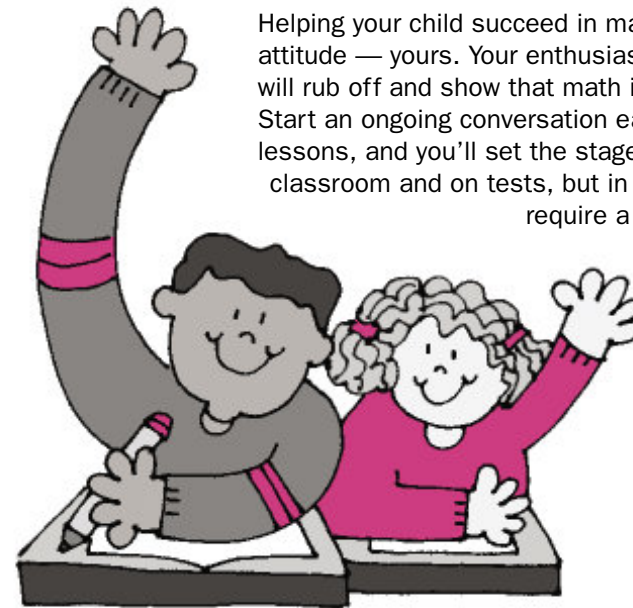
The Cincinnati Public School District's mathematics content standards are designed to prepare all students for success in school, college and the workplace. They are the same high standards adopted by the Ohio Board of Education in December 2001. The State Department of Education will use these standards in developing new statewide tests to measure student performance.

Before drafting the standards, advisory groups reviewed world-class standards from the United States and other countries. The standards-writing teams included teachers, parents, school administrators and business and college representatives. Before the standards were final, mathematics experts and the public reviewed them and added their feedback.

Described as "rigorous yet realistic," the six standards cover important math concepts and skills — and use of these concepts and skills to solve problems.

Parent Tip

Helping your child succeed in math begins with a positive attitude — yours. Your enthusiasm about your child's learning will rub off and show that math is both important and fun. Start an ongoing conversation early with your child about math lessons, and you'll set the stage for success not only in the classroom and on tests, but in everyday situations that require a solid math background, such as grocery shopping and balancing a checkbook.



How to use this Guide

Relax.

This guide covers a lot of mathematical ground, but you don't have to. You'll find general, "big picture" overviews of standards. You also will find grade-specific requirements, known as **indicators**, on pages 4-15. Work with the level and amount of information that fit your family's needs.

Get familiar.

On page 3, you'll find a list of the district's six math standards along with a non-mathematician's explanation of what each one of them means to your child.

Skim and scan.

Each grade-level summary begins with a brief overview that describes how standards fit into your child's overall learning. If you want to know more, you can then read more detailed learning goals, too. A glossary is included with definitions for many of the mathematics terms used in the grade-level indicators. Words defined in the glossary are written in **bold** type.

Stay involved.

Whether you're helping with homework or preparing for teacher conferences, taking an active role in your child's math education makes a difference. Use the information in this booklet to work closely with teachers and help chart your child's progress. Use pages 21-24 to jot down homework and conference notes.

Explore more.

On page 20, you'll find a list of math education resources — Web sites and books that can help solve math problems and explain complicated concepts. And at every grade level, you'll see a bit of "homework" for you — ways to help build your child's confidence, as well as math skills.



**Keep this booklet
handy until your child
completes 4th grade.**

Grades 5-8 Mathematics Standards

Number, Number Sense and Operations

What it means to your child: Understanding numbers, what they mean and how they are used — from basic counting to pencil-and-paper calculations to age-appropriate use of calculators and computers.

Measurement

What it means to your child: Clearly understanding and successfully using appropriate measurement tools, terms and technology.

Geometry and Spatial Sense

What it means to your child: Identifying, classifying and analyzing one-, two- and three-dimensional objects, as well as understanding their properties and using that understanding to solve problems.

Patterns, Functions and Algebra

What it means to your child: Using tables, graphs and equations to represent, analyze and solve problems based on changeable quantities.

Data Analysis and Probability

What it means to your child: Designing data collection and organizing and interpreting results to answer questions, illustrate relationships and make predictions.

Mathematical Processes

What it means to your child: Using and effectively communicating mathematics to solve practical problems and make decisions.

Fifth-Grade Standards

For fifth-graders, math knowledge expands to include understanding ratios and how they work. Students' ability to reason through problems also increases as they make predictions based on a growing knowledge base of rules about numbers, measurements, geometry and algebra. Now that they've learned strategies for choosing data collection tools, their analytical work grows as they collect, organize and find effective ways to represent ever more complex types of data.

By the end of fifth grade, students should be able to:

Number, Number Sense and Operations

- Understand the concepts of **ratio** and **percent** both in models and in print.
- Create and use forms of "one" (such as $2/2$ or $3/3$) to break down fractions. *For example: $18/24 = 9/12 \times 2/2 = 3/4 \times 6/6$; so $18/24 = 3/4$.*
- Identify and create equivalent forms for decimals rounded to a given place value and for percents rounded to the nearest half.
- Know square roots.
- Use practical situations to identify and compare negative numbers. *For example, determine an amount of money owed or a frigid temperature.*
- Simplify and answer problems using **commutative**, **associative**, **distributive**, **identity** and **inverse** properties.
- Use relationships between operations, including order and use of parentheses, to simplify and solve complex problems.
- Understand the need for common denominators for addition and subtraction and explain how that same theory works with decimals.
- Add and subtract decimals and fractions with like and unlike denominators. Use different strategies to estimate results.

Measurement

- Measure and draw degrees of angles and recognize angles like 45 degrees and 90 degrees as ways to estimate other angles.

Measurement Fifth-Grade Standards (cont.)

- Identify and compare paths connecting points on a single plane.
- Understand the difference between measuring the surface of flat areas (**linear units**) and the volume of 3-dimensional objects (square and **cubic units**).
- Make conversions and computations within the same measurement system.
- Find **perimeters** and **areas** of triangles, rectangles and **parallelograms** and volumes of rectangular prisms.

Geometry and Spatial Sense

- Draw and determine relationships between elements of circles, including **radius**, **diameter**, center and **circumference**, including the necessary formulas.
- Understand how to measure angles and know their parts: vertex, rays, interior and exterior.
- Use the properties of **congruent** figures to solve problems.
- Calculate the sum of interior angles of triangles and **quadrilaterals** using physical models.
- Understand negative points on a coordinate system.
- Predict and confirm what kind of 3-dimensional object is created after folding a 2-dimensional **net**.

Patterns, Functions and Algebra

- Use models, words, tables, graphs, unknown variables or other visual aids to justify general rules for patterns and functions, including developing such patterns using calculators or computers.
- Make predictions and draw conclusions about problem situations by representing them in visual models as well as through equations and inequalities.
- Describe **qualitative** changes in related variables. *For example, explain and show how rates of growth can vary over time based on data in a table or graph.*

Data Analysis and Probability

- Select the best way to represent data based on its form. For example, does the problem involve numbers or categories? Also, construct and use **frequency tables, circle graphs** and **line graphs**.
- Solve problems using data collection. This includes constructing appropriate questions and making predictions about results with any necessary adjustments. It also includes collecting, displaying and drawing conclusions about data.
- Determine and explain use of the **range, mean, median** and **mode** of specific data sets.
- List and explain all possible outcomes in a given situation.
- Use 0, 1 and the ratios in between to show the probability of an event within a simple experiment, such as three chances out of eight.
- Compare and make predictions based on what should happen (theoretical/expected) and what did happen (experimental/actual) in a simple experiment.

Parent Tip

Visit your child's math class and find out how you can help out — either in the classroom or at home — with any experiments the teacher has planned.



Sixth-Grade Standards

For sixth-graders, math includes an ever-expanding array of terms and ways of understanding numbers, shapes and their relationship to the world around them. All of these new efforts in learning continue to focus on enhancing problem-solving skills and understanding more complex math principles.

By the end of sixth grade, students should be able to:

Number, Number Sense and Operations

- Know about “squared” and “cubed” numbers, as well as how to create and break down whole numbers into factors and exponents.
- Solve problems by breaking down whole numbers into their prime factors, as well as recognize the greatest common factor (GCF) and least common multiple (LCM). For example, $18 = 2 \times 3 \times 3$ and $24 = 2 \times 2 \times 2 \times 3$. Their GCF is $6(2 \times 3)$. Their LCM is $2 \times 2 \times 2 \times 3 \times 3$ or 72.
- Understand and explain the concept of **rational numbers**.
- Use real-life examples to find percentages of numbers.
- Illustrate the concepts of **ratio**, proportion and **percent** in models and pictures, including percents less than one and greater than 100, and solve related problems. For example, find the percent markdown if the original price was \$140 and the sale price is \$100.
- Explain how ratios represent comparisons (part-to-part, part-to-whole, whole-to-part).
- Simplify numbers using exponents, decimals and **rational** numbers.
- Represent and solve problems with simple math expressions. For example, determine the net gain/loss if a running back loses 15 yards on one run but gains 8 yards on the next.
- Use a variety of methods to multiply and divide fractions and decimals, including representing these actions using patterns of blocks and **algorithms**.
- Understand that when dividing fractions, the quotient may be larger than the dividend. For example, $(6 \div \frac{1}{2} = 12)$.
- Estimate and analyze the reasonableness of solutions to problems with fractions and decimals using ratios and percents as guides.

Sixth-Grade Standards (cont.)

Measurement

- Understand the differences between and appropriate uses for different measures, including **perimeter**, **area**, surface area and volume. *For example, to determine length for a garden fence, you'd measure perimeter; to determine how much paint needed to cover a room, you'd measure surface area.*
- Estimate **perimeter** or **circumference** and area for circles, triangles and quadrilaterals, as well as surface area and volume for prisms and cylinders by using various strategies. These include physical tools (*judging 1/2, 1/4 of circles, using string or tiles*) and measuring specific elements, and using appropriate formulas.
- Describe changes in perimeters and areas of 2-dimensional shapes as measures change. *For example, explain what happens if you double the length of the sides of a square.*
- Understand and use geometric terms appropriately, including: "interior angle measures," "perpendicular/parallel sides and planes," "congruent angles/sides," "vertex," "face," "altitude," "diagonal," "isosceles," "equilateral," "acute" and "obtuse."
- Classify triangles using more than one characteristic. *For example, classify a triangle with no equal sides and a 90-degree angle as a right scalene triangle.*
- Understand the impact of transformations of 2-dimensional objects, including **reflections**, **rotations**, **translations** and **dilations**.
- Draw proportional representations of images (*two times the size, half the size, etc.*). Build 3-dimensional objects with cubes and sketch their 2-dimensional representations.

Parent tip

Surf the Internet with your child — at home, at school or at your neighborhood public library — to explore math resources and online math games. Try visiting www.figurethis.org, which offers math challenges for families.



Sixth-Grade Standards (cont.)

Patterns, Functions and Algebra

- Use models, tables and graphs, as well as words and symbols, to represent patterns, rules and functions.
- Explain how **commutative**, **associative** and **distributive** properties can be used to create equivalencies and solve problems. *For example, the distributive property shows perimeter as $2(l+w)$ or $2(l) + 2(w)$.*
- Create and use models, paper-and-pencil equations with known and unknown variables, tables and graphs to evaluate relationships between variables and solve problems.
- Identify, describe and compare situations with constant or varied rates of change, and use computers and/or calculators to analyze rates of change.

Data Analysis and Probability

- Select, create and use **line graphs**, **circle graphs** and **histograms** appropriately.
- Compare the same data represented in different types of graphs.
- Understand the difference between interpreting data based on measures of center (**mean**, **mode** and **medium**) and measures of spread (**range**).
- Describe and reason logically about data and data distribution within **histograms** and **frequency tables**. This includes the ability to identify the number of **modes**, the middle of the data, the level of **symmetry** and any **outliers**.
- Design an experiment to test a theory and explain how its results may vary.

Seventh-Grade Standards

For seventh-graders, knowledge of math — and the vocabulary that describes it — continues to become more complex. Students translate abstract principles and formulas into concrete problem-solving strategies. They understand a greater variety of shapes and their properties and use equations to solve problems. After years of collecting and drawing conclusions about data, they learn new ways to represent statistical information sharpen practical analytical skills about its use.

By the end of seventh grade, students should be able to:

Number, Number Sense and Operations

- Use powers of 10. Write large numbers in **scientific notation**.
- Explain positive and negative exponents.
- Understand and use calculators or computers to show the difference between **rational numbers** and **irrational numbers**.
- Simplify and solve real-life problems using whole numbers, **integers** and/or **rational numbers**.
- Add, subtract, multiply and divide **integers**.
- Solve problems, by using a series of steps when necessary, involving percents, **integers**, **absolute value**, exponents and square roots (for perfect squares only).

Measurement

- Solve problems using appropriate measurement units. *For example, use miles per hour or revolutions per minute.*
- Convert area and volume measurements within the same system and use those conversions to model and solve problems. *For example, convert square feet to square yards or cubic meters to cubic centimeters.*
- Estimate a measurement to a greater degree of precision than the measuring tool allows.
- Analyze measurement-related problems, use appropriate strategies and approaches to solve more complicated problems, including finding the area of trapezoids and composite shapes and the volume of cylinders and prisms.

Measurement Seventh-Grade Standards (cont.)

- Understand the difference between surface area and volume and how those values may vary for the same objects.
- Describe changes in **perimeters** and areas of 3-dimensional objects as measures change, such as doubling the length of the sides of a cube.

Geometry and Spatial Sense

- Identify multiple properties that define specific objects (*all squares are rectangles; only squares are **quadrilaterals** that have all sides and angles equal*). Use proportions and scaling to describe relationships between similar figures and solve problems.
- Understand and solve problems using the properties of triangles, including the **Pythagorean Theorem** ($a^2 = b^2 + c^2$).
- Determine **congruent** triangles; apply relevant principles to solve problems about missing lengths and angle measures.
- Fold paper, trace and use graph paper to perform **translations**, **reflections**, **rotations** and **dilations** of 2-dimensional objects. Draw upon knowledge to solve geometric problems.
- Draw 3-dimensional objects from different perspectives.

Patterns, Functions and Algebra

- Use models, tables, graphs and simple variable expressions, as well as words and symbols, to represent patterns, rules and functions.
- Describe patterns and explain how to extend them, including simple linear progressions (1, 3, 5, 7) and nonlinear progressions (1, 3, 4, 8, 16). Explain how changes in one variable alter others.
- Create, model and solve equations using **inverse** operations.



Parent Tip

Find practical applications for math knowledge at home — work together to develop a budget for your next family vacation, or figure how many weeks' allowance a desired toy or clothing item will cost.

- Illustrate linear equations and inequalities in a single plane or on a number line.
- Justify equivalent equations and know when they are simplified. *For example, $5a + 4 + 3a = 8a + 4$.*
- Use formulas to solve problems.
- Understand different uses of variables (unknown quantities, parts of formulas or patterns). Use calculators or computers to analyze mathematical relationships, such as the connection between distance and time.

Data Analysis and Probability

- Select, read, create and interpret **box-and-whisker plots**, **stem-and-leaf plots** and other graphs that are appropriate to specific problems. Analyze graphing decisions.
- Analyze data by comparing measures of center versus measures of spread and describe the influence of **outliers**.
- Compare the same data represented in different types of graphs and construct arguments based on differing results.
- Show how the selection of different sample data can influence results and extend that reasoning to identify misuse of statistics in the media.
- Compute probabilities of compound events (*multiple coin tosses, multiple rolls of multiple dice*) by using lists, **tree diagrams** and models.
- Make predictions based on probabilities, then design and conduct experiments to test them. Explain the results.

Eighth-Grade Standards

For eighth-graders, math is an essential part of understanding the world and solving everyday problems. Their math vocabulary continues to grow, as does their knowledge of rules and a wide range of number-based functions. They also get plenty of practice predicting outcomes of experiments and events and analyzing actual results.

By the end of eighth grade, students should be able to:

Number, Number Sense and Operations

- Write, add, subtract, multiply and divide both large and small numbers in **scientific notation**.
- Understand **natural numbers, integers, rational** and **irrational numbers**.
- Simplify and compute numbers and expressions with exponents and those grouped within parenthesis.
- Solve problems using **identity** and **inverse** properties.
- Estimate, compute and solve problems involving **rational numbers** (*ratios, proportions and percents*) and determine when estimates can solve problems.
- Find square roots of perfect squares and approximate square roots of non-perfect squares. *For example, $\sqrt{130}$ is between 11 and 12 because 11^2 is 121 and 12^2 is 144.*

Measurement

- Compare and order U.S. and metric measurement units.
- Convert from one measurement system to another. *For example, translate degrees Fahrenheit into Celsius.*
- Use models to justify formulas for surface area and volume. *For example, find the surface area of a cylinder as it relates to its height and width.*
- Analyze the parts of a pyramid to determine its surface area.
- Calculate all measures with appropriate precision.
- Use models, graphs and formulas to solve problems involving rates such as velocity (speed) and density (thickness).
- Add the interior and exterior angles of polygons with and without the use of a protractor.

Measurement
Eighth-Grade Standards (cont.)

- Use two types of formulas to compute the surface area and volume of prisms, pyramids and cylinders and the volume of spheres and cones — conventional formulas as well as formulas used for triangles, **quadrilaterals** and circles.

Geometry and Spatial Sense

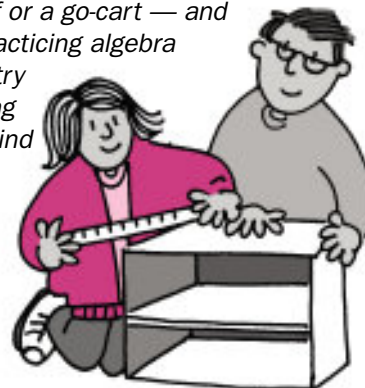
- Make and test ideas about the sides, angles, **symmetry** and other aspects of 2- and 3-dimensional objects.
- Recognize the angles formed — and the relationships between those angles — when two lines cross each other and when a line crosses two parallel lines.
- Solve problems involving similar figures using proportions (*part-to-part, part-to-whole, etc.*).
- Use coordinate geometry to model and analyze shapes. *For example, if you know three corners of a square, you can find the fourth corner.*
- Draw and analyze the results of **translations, reflections, rotations** and **dilations** of objects in the same plane.
- Draw **nets** of prisms, pyramids, cylinders and cones.

Patterns, Functions and Algebra

- Relate different representations of numerical relationships, such as relating tables to graphs.
- Describe how to find the n th value of a pattern or sequence.
- Tell the difference between linear and nonlinear functions based on tables, graphs or equations. Explain differences and changes in these functions as well as **continuous** vs. noncontinuous and direct variation vs. **inverse** variation relationships.
- Use **covariants** and solve simple quadratic equations. *For example, $y = x^2 - 16$.*

Parent Tip

Build something with your child — a bookshelf or a go-cart — and you'll be practicing algebra and geometry while making a one-of-a-kind creation.



Patterns, Functions and Algebra
Eighth-Grade Standards (cont.)

- Add and subtract **monomials** and **polynomials**. Multiply polynomials by monomials.
- Use real-world terms to explain the equations of a line on a graph, including the meaning of its slope as it shows a constant rate of change.
- Represent and solve problems using equations, inequalities, graphs, tables and simplified algebraic expressions (including formulas).
- Use graphs, symbols and technology to solve linear equations and inequalities.
- Solve and interpret the meaning of solutions to “2 by 2” equations (two different equations with the same x and y values).
- Compute and interpret slope, midpoint and distance of a set of ordered pairs (x and y coordinates on a plane) and describe how any changes in variable values affect the resulting graphs.
- Use calculators or computers to analyze change over time. *For example, compute interest compounded over time.*

Data Analysis and Probability

- Understand relationships within **scatterplots** (which represent each item as one point that measures two of its attributes). Analyze graph choice decisions, including how best to represent **discrete** and **continuous** data.
- Compare two sets of data using measures of center and measures of spread (range).
- Explain how the **mean** is sensitive to extremes and how it can be used to compare **median** and **mode**.
- Identify different sample selection methods — including random, representative and convenience sampling as well as surveys. Describe how sample size affects any predictions.
- Analyze data and interpret graphs to construct convincing arguments.
- Calculate the number of possible outcomes for events, including those dependent on order and/or repeated items.
- Use addition or multiplication of probabilities to determine the likelihood of either one or two unconnected events occurring.

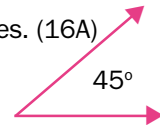
Mathematics Glossary

Absolute value: The distance of a number from 0 (always positive) on a number line.

Acute: Angle whose measure is greater than 0 degrees and less than 90 degrees. (16A)

Algorithms: Steps and procedures created to solve problems.

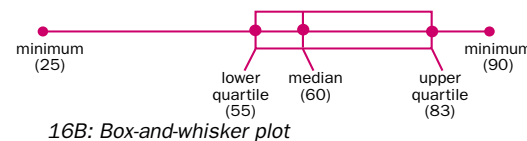
Area: The number of unit squares that can be fit into a 2-dimensional figure. 16A: Acute Angle



Associative property: This property states that changes in grouping numbers do not change the end value. For example, “ $a(bc) = (ab)c$.”

Box-and-whisker plots: Graphs that show the range of data. (16B)

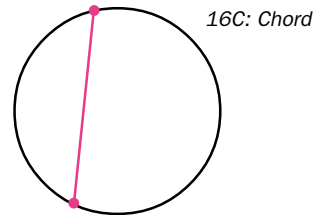
Chord: A straight line from one point in a circle to another. (16C)



Circle graphs: Graphs that divide data and/or occurrences into pie slices.

Circumference: The distance around a circle.

Commutative property: This property states that when the order of numbers changes, the values do not. For example, “ $4 + 5 = 5 + 4$.”



Compatible numbers: Easy-to-use approximate values of more complicated numbers.

Compensatory numbers: Numbers needed to correct approximations made using compatible numbers.

Composite numbers: Numbers that are not prime. They can be divided by more than 2 factors with no remainders. For example, 12 is composite because its factors are 1, 2, 3, 4, 6 and 12.

Congruent shapes: Forms that have the same shape and size.

Continuous data: Data that can be assigned an infinite number of values between whole numbers.

Covariants: Varying with another variable quantity in a manner that leaves a specified relationship unchanged. For example, $y = x^2 - 16$.

Cube root: The number which, multiplied by itself twice, equals the original number. For example, the cube root of 8 is 2 because $2 \times 2 \times 2 = 8$.

Cubic units: These units measure volume of 3-dimensional objects.

Diameter: The distance across a circle through the center.

Discrete data: Data that can be counted.

Distributive property: This property states that for any real numbers a, b and c, $a(b+c) = ab + ac$.

Edge: The intersection of two sides of a 3-dimensional object.

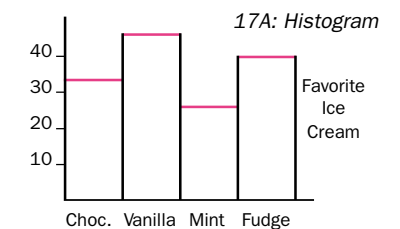
Face: The shape bounded by the edges on a 3-dimensional object.

Frequency tables: These tables record the numbers of occurrences of a given variable.

Front-end estimations: These estimates approximate sums by adding or subtracting with similar numerals in the hundreds and/or tens places. For example, $468 + 365 + 234 \cong 400 + 300 + 200 = 900$.

Growing patterns: These occur when the relationship between numbers in a pattern involves a progression.

Histograms: These graphs display data frequency through equal intervals with bars. (17A)



Identity property: This property states that adding 0 or multiplying by 1 do not change the values of numbers.

Integers: Whole numbers and their opposites.

Inverse: These operations do the opposite of each other. For example, addition and subtraction are inverses, as are multiplication and division.

Irrational numbers: Numbers that cannot be divided evenly and have unending decimal values, for example, $\pi = 3.1415926 \dots$

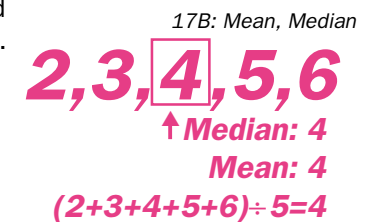
Line graphs: Graphs that plot sets of variables on a plane.

Linear units: Units that measure length.

Mean: The average of a set of numbers. (17B)

Median: The middle number of a set of data grouped in order. (17B)

Mode: The most frequently appearing number or object in a set of data.



Glossary

Monomials: Numbers written as single units, with or without variables.
For example, 3, $45x$ and $58xyz$.

Multiplicative patterns: These occur when the relationship between numbers in a pattern involves multiplication.

Natural numbers: Whole, positive numbers, 1, 2, 3, ...

Nets: Flat diagrams that can be folded into 3-dimensional solid shapes.

Obtuse: An angle measure greater than 90 degrees and less than 180 degrees. (18A)

Outliers: Points in a range of data that are widely separated from clusters of main data.

Parallelograms: Four-sided figures in which the opposite sides are parallel to each other.

Percent: Value that represents a part-to-whole relationship.
For example, $75\% = 75/100$.

Perimeter: The total distance around the edge of a figure. (18B)

Polynomials: Monomials grouped by addition and/or subtraction.

Prime number: Number that can only be divided by 1 and itself.

Pythagorean Theorem: The formula that computes the lengths of the sides of a right triangle. ($a^2 + b^2 = c^2$)

Quadrilaterals: Four-sided objects, like squares and trapezoids.

Qualitative: Non-numerical data that can be assigned qualities or categories.

Quantitative: Numerical data.

Radicals: Signs used to show a square root, cube root, or other higher root.

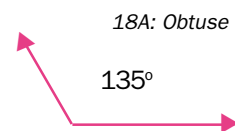
Radius: The distance from a circle's center to its edge. (18C)

Range: The highest number minus the lowest number in a set of numbers.

Ratio: This value represents part-to-part and part-to-whole relationships.

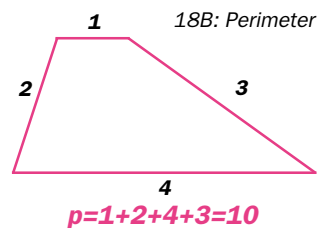
Rational numbers: Numbers that can be written as a/b , where a and b are integers and $b \neq 0$.

Rational expression: Fractions whose numerators and denominators are polynomials.
For example, $\frac{n^2 - 3n}{2}$.



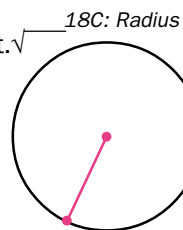
18A: Obtuse

135°



18B: Perimeter

$$p = 1 + 2 + 4 + 3 = 10$$



18C: Radius

Rectangular arrays: Numbers arranged in rows and columns to illustrate the concept of multiplication.

Reflection: A transformation that flips an object to show its mirror image.

Right: Relating to 90 degrees. For example, a right angle measures 90 degrees, and a right triangle has only one right angle.

Right triangle: Triangle with one 90-degree angle. (19A)

Rotation: A transformation that turns an object around a single fixed point.

Scatterplots: Models that represent each item in a set of data as one point that measures two of its attributes. (19B)

Scientific notation: Notation method that shows numbers as products of a power of 10 and a decimal number between one and 10. For example, 8,924,000 becomes 8.924×10^6 .

Similar shapes: Forms that have the same shape but different size.

Skip counting: Counting by skipping numbers in a pattern. For example, "3, 6, 9, 12, etc."

Square root: The number which, when multiplied by itself, equals the original number.

Stem-and-leaf plots: A frequency diagram that displays both the actual data and the data frequency.

Superposition: Occurs when placing one shape on top of another to compare their similarities and differences.

Symmetry: Correspondence in size, form and arrangement of parts on opposite sides of a plane, line or point.

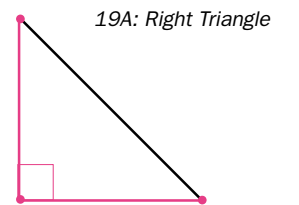
Translations: These are changes in which every point in an object moves the same distance and direction.

Tree diagram: This type of diagram shows the number of ways an event may occur. For example, one could show the possible combinations after tossing three coins.

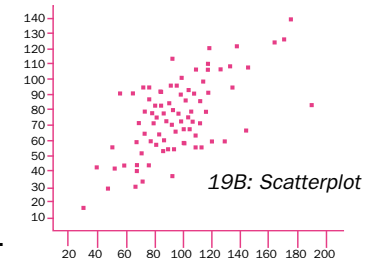
Venn diagram: This type of diagram consists of circles that do and/or do not intersect to show relationships between more than one set. (19C)

Vertex: The point of intersection of two segments, lines or rays.

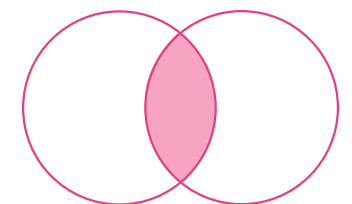
Zero of a function: The solution to an equation which intersects the x-axis on a graph ($x = 0$).



19A: Right Triangle



19B: Scatterplot



19C: Venn Diagram

Math Resources for Parents*

<http://www.figurethis.org/>

A site dedicated to fun math activities for the family.

<http://sosmath.com/>

Offers more than 2,500 pages of math help, explained in easy-to-understand language.

<http://askdrmath.com/>

This resource from Drexel University provides math resources by subject and a large archive of answers to specific and general math questions.

<http://www.mathleague.com/>

A good math study resource for 4th to 8th graders.

<http://school.discovery.com/homeworkhelp/webmath/>

The Discovery School's math helper offers help with homework as well as math lessons that parents and students can work on together.

<http://www.nctm.org/corners/families/index.htm>

The National Council of Teachers of Mathematics Web site offers a family corner with tips for parents.

<http://www.ed.gov/pubs/parents/LearnPtnrs/math>

This U.S. Department of Education link outlines family activities that practice math for the fun of it.

<http://www.mathgoodies.com/>

Interactive math lessons, homework help, worksheets and puzzles with a special section geared toward parents.

Math Coach: A Parent's Guide to Helping Children Succeed in Math, by Wayne A. Wickelgren and Ingrid Wickelgren (Berkley Publishing Group, 2001)

This guide translates math concepts so parents can help their students learn.

How to Help Your Child Excel in Math: An A to Z Survival Guide, by Brita Immergut (Career Press, Incorporated, 2001)

Simple, easy-to-follow explanations for math terms, from A to Z.

**Please be aware that Internet resources are subject to change.*

Standards Notes for
(Student's Name)

Homework Notes

This is a good place for you to keep track of your child's homework assignments and how they connect to the standards. It's an opportunity to write down specific skills or concepts in which your child may need some extra help. Just as important, it's a place where you can note positive comments when your child does good work.

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Extra pages are available through the school office or by logging on to the CPS Web site, www.cps-k12.org, and clicking the Standards button.

Standards Notes for
(Student's Name)

conference notes

This is a good place for you to list questions that you want to make sure you ask your child's teacher during conferences at the end of progress reporting periods. Consider sharing information that might be useful to your child's teacher about your child's personal strengths, challenges and most effective learning styles (coaching, small group work, projects, individual study, etc.)

Conference Questions/Comments for my Child's Teacher

Child's Grade Level _____

Date	Questions/Comments
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**Setting
the
Standard**

Cincinnati Public Schools

Raising Academic Achievement

Mathematics

5-8 Standards Guide

for Parents and
Community Members



Cincinnati Public Schools
P.O. Box 5381
Cincinnati, Ohio 45201-5381
Located at 2651 Burnet Avenue
www.cps-k12.org

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Student's Name